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**Fourth Edition**

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# McGraw-Hill DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS

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## Fourth Edition

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On the title pages: Aerial photograph of the Sinai Peninsula made by Gemini spacecraft. (NASA)

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when 1 mole of a substance is adsorbed upon another at constant pressure. { 'hēt əv ad'sɔrpʃən }

**heat of aggregation** [THERMO] The increase in enthalpy when an aggregate of matter, such as a crystal, is formed at constant pressure. { 'hēt əv, ʔgr-ə'gā-shən }

**heat of association** [PHYS CHEM] Increase in enthalpy accompanying the formation of 1 mole of a coordination compound from its constituent molecules or other particles at constant pressure. { 'hēt əv ə,sō'sē'ā-shən }

**heat of combustion** [PHYS CHEM] The amount of heat released in the oxidation of 1 mole of a substance at constant pressure, or constant volume. Also known as heat value; heating value. { 'hēt əv kəm'bəs'chən }

**heat of compression** [THERMO] Heat generated when air is compressed. { 'hēt əv kəm'prɛʃ-ən }

**heat of condensation** [THERMO] The increase in enthalpy accompanying the conversion of 1 mole of vapor into liquid at constant pressure and temperature. { 'hēt əv, känd-ən'sā-shən }

**heat of cooling** [THERMO] Increase in enthalpy during cooling of a system at constant pressure, resulting from an internal change such as an allotropic transformation. { 'hēt əv 'kūl-ɪŋ }

**heat of crystallization** [THERMO] The increase in enthalpy when 1 mole of a substance is transformed into its crystalline state at constant pressure. { 'hēt əv, krist-əl-ə'zā-shən }

**heat of decomposition** [PHYS CHEM] The change in enthalpy accompanying the decomposition of 1 mole of a compound into its elements at constant pressure. { 'hēt əv dē,kāmp-ə'zish-ən }

**heat of dilution** [PHYS CHEM] 1. The increase in enthalpy accompanying the addition of a specified amount of solvent to a solution of constant pressure. Also known as integral heat of dilution; total heat of dilution. 2. The increase in enthalpy when an infinitesimal amount of solvent is added to a solution at constant pressure. Also known as differential heat of dilution. { 'hēt əv də'lū-shən }

**heat of dissociation** [PHYS CHEM] The increase in enthalpy at constant pressure, when molecules break apart or valence linkages rupture. { 'hēt əv di,sō'sē'ā-shən }

**heat of emission** [ELECTR] Additional heat energy that must be supplied to an electron-emitting surface to maintain it at a constant temperature. { 'hēt əv i'mish-ən }

**heat of evaporation** See heat of vaporization. { 'hēt əv i,vap-ə'rā-shən }

**heat of formation** [PHYS CHEM] The increase in enthalpy resulting from the formation of 1 mole of a substance from its elements at constant pressure. { 'hēt əv fɔr'mā-shən }

**heat of fusion** [THERMO] The increase in enthalpy accompanying the conversion of 1 mole, or a unit mass, of a solid to a liquid at its melting point at constant pressure and temperature. Also known as latent heat of fusion. { 'hēt əv 'fyū-zhən }

**heat of hydration** [PHYS CHEM] The increase in enthalpy accompanying the formation of 1 mole of a hydrate from the anhydrous form of the compound and from water at constant pressure. { 'hēt əv hī'drā-shən }

**heat of ionization** [PHYS CHEM] The increase in enthalpy when 1 mole of a substance is completely ionized at constant pressure. { 'hēt əv, i-ən-ə'zā-shən }

**heat of linkage** [PHYS CHEM] The bond energy of a particular type of valence linkage between atoms in a molecule, as determined by the energy required to dissociate all bonds of the type in 1 mole of the compound divided by the number of such bonds in a compound. { 'hēt əv 'lɪŋk-ɪj }

**heat of mixing** [THERMO] The difference between the enthalpy of a mixture and the sum of the enthalpies of its components at the same pressure and temperature. { 'hēt əv 'mɪk-sɪŋ }

**heat of reaction** [PHYS CHEM] 1. The negative of the change in enthalpy accompanying a chemical reaction at constant pressure. 2. The negative of the change in internal energy accompanying a chemical reaction at constant volume. { 'hēt əv rē'ak-shən }

**heat of solidification** [THERMO] The increase in enthalpy when 1 mole of a solid is formed from a liquid or, less commonly, a gas at constant pressure and temperature. { 'hēt əv sə,lɪd-ə'fā'kā-shən }

**heat of solution** [PHYS CHEM] The enthalpy of a solution

minus the sum of the enthalpies of its components. Also known as integral heat of solution; total heat of solution. { 'hēt əv sə'lū-shən }

**heat of sublimation** [THERMO] The increase in enthalpy accompanying the conversion of 1 mole, or unit mass, of a solid to a vapor at constant pressure and temperature. Also known as latent heat of sublimation. { 'hēt əv, səb-lə'mā-shən }

**heat of transformation** [THERMO] The increase in enthalpy of a substance when it undergoes some phase change at constant pressure and temperature. { 'hēt əv, tranz-fɔr'mā-shən }

**heat of vaporization** [THERMO] The quantity of energy required to evaporate 1 mole, or a unit mass, of a liquid, at constant pressure and temperature. Also known as enthalpy of vaporization; heat of evaporation; latent heat of vaporization. { 'hēt əv, vā-pə-rā'zā-shən }

**heat of wetting** [THERMO] 1. The heat of adsorption of water on a substance. 2. The additional heat required, above the heat of vaporization of free water, to evaporate water from a substance in which it has been absorbed. { 'hēt əv 'wed-ɪŋ }

**heat pipe** [ENG] A heat-transfer device consisting of a sealed metal tube with an inner lining of wicklike capillary material and a small amount of fluid in a partial vacuum; heat is absorbed at one end by vaporization of the fluid and is released at the other end by condensation of the vapor. { 'hēt, pɪp }

**heat pump** [MECH ENG] A device which transfers heat from a cooler reservoir to a hotter one, expending mechanical energy in the process, especially when the main purpose is to heat the hot reservoir rather than refrigerate the cold one. { 'hēt, pʌmp }

**heat quantity** [THERMO] A measured amount of heat; units are the small calorie, normal calorie, mean calorie, and large calorie. { 'hēt, 'kwān-ə'dē }

**heat radiation** [THERMO] The energy radiated by solids, liquids, and gases in the form of electromagnetic waves as a result of their temperature. Also known as thermal radiation. { 'hēt, rād-ē'ā-shən }

**heat rash** See miliaria. { 'hēt, rʌʃ }

**heat rate** [MECH ENG] An expression of the conversion efficiency of a thermal power plant or engine, as heat input per unit of work output; for example, Btu/kWhr. { 'hēt, rāt }

**heat reactor** [NUCLEO] A nuclear reactor designed primarily to supply heat for industrial purposes. { 'hēt rē'akt-ər }

**heat release** [THERMO] The quantity of heat released by a furnace or other heating mechanism per second, divided by its volume. { 'hēt ri,lēs }

**heat resistance** See thermal resistance. { 'hēt ri,zɪst-əns }

**heat-resistant alloy** [MET] An oxidation-resistant alloy. { 'hēt ri,zɪst-ənt, 'al,ɔi }

**heat-resistant glass** [MATER] Glass, such as borosilicate glass, that is heat-treated or leached to remove alkali so that it withstands high heat and sudden cooling without shattering. { 'hēt ri,zɪst-ənt, 'glas }

**heat run** [ELEC] A series of temperature measurements made on an electric device during operating tests under various conditions. { 'hēt, rʌn }

**heat seal** [ENG] A union between two thermoplastic surfaces by application of heat and pressure to the joint. { 'hēt, sēl }

**heatseeker** [ORD] A guided missile incorporating an infrared device for homing on heat-radiating machines or installations, such as an aircraft engine or a blast furnace. { 'hēt, sēk-ər }

**heat set** [TEXT] A process to fix or set a crimp or texture in yarn by use of heat. { 'hēt, set }

**heat shield** [MATER] Any protective layer that gives protection from heat; used on the front of a reentry capsule. { 'hēt, 'shēld }

**heat-shrinkable tubing** [MATER] A type of plastic tubing that can be heated and shrink-fitted over terminals and other objects of varying sizes and shapes, for insulating and other purposes. { 'hēt, 'ʃrɪŋk-ə'bəl, 'tūb-ɪŋ }

**heat shunt** [MET] A heatsink placed in contact with the lead of a delicate component to prevent overheating during soldering. { 'hēt, 'ʃənt }

**heatsink** [AERO ENG] 1. A type of protective device capable of absorbing heat and used as a heat shield. 2. In nuclear propulsion, any thermodynamic device, such as a radiator or condenser, that is designed to absorb the excess heat energy of the working fluid. Also known as heat dump. [ELEC] A mass of metal that is added to a device for the purpose of absorbing and dissipating heat; used with power transistors and



## heatsink cooling

many types of metallic rectifiers. Also known as dissipator. [THERMO]. Any (gas, solid, or liquid) region where heat is absorbed. { 'hēt, sɪŋk }

**heatsink cooling** [ENG] Cooling a body or system by allowing heat to be absorbed from it by another body. { 'hēt, sɪŋk 'kūlɪŋ }

**heat source** [THERMO] Any device or natural body that supplies heat. { 'hēt, sɔrs }

**heat sterilization** [ENG] An act of destroying all forms of life on and in bacteriological media, foods, hospital supplies, and other materials by means of moist or dry heat. { 'hēt, ster-ə-lə'zər-shən }

**heat storage** [OCEANOGR] The tendency of the ocean to act as a heat reservoir; results in smaller daily and annual variations in temperature over the sea. { 'hēt, stɔr-ɪj }

**heat stress index** [PHYSIO] Relation of the amount of evaporation or perspiration required for particular job conditions as related to the maximum evaporative capacity of an average person. Abbreviated HSI. { 'hēt, stres 'ɪn, deks }

**heatstroke** [MED] A heat-exposure syndrome characterized by hyperpyrexia and prostration due to diminution or cessation of sweating, occurring most commonly in persons with underlying disease. { 'hēt, strɒk }

**heat thunderstorm** [METEOROL] In popular terminology, a thunderstorm of the air mass type which develops near the end of a hot, humid summer day. { 'hēt 'θʌn-dər, stɔrm }

**heat time** [MET] Duration of a single current impulse in pulsation welding. { 'hēt, tɪm }

**heat tinting** [MET] Oxidation of a polished metal surface by heating to reveal the microstructure. { 'hēt, tɪnt-ɪŋ }

**heat transfer** [THERMO] The movement of heat from one body to another (gas, liquid, solid, or combinations thereof) by means of radiation, convection, or conduction. { 'hēt 'tranz-fər }

**heat-transfer coefficient** [THERMO] The amount of heat which passes through a unit area of a medium or system in a unit time when the temperature difference between the boundaries of the system is 1 degree. { 'hēt 'tranz-fər, kōi'fɪʃ-ənt }

**heat-transfer oil** [MATER] An oil used to transport heat or cold between two areas of process-equipment surface, and especially compounded to avoid heat degradation in the temperature range of application. { 'hēt 'tranz-fər, ɔil }

**heat transmission** See heat flow. { 'hēt tranz, mɪʃ-ən }

**heat transport** [THERMO] Process by which heat is carried past a fixed point or across a fixed plane, as in a warm current. { 'hēt 'tranz, pɔrt }

**heat-treatable alloy** [MET] An alloy that can be hardened by thermal treatment. { 'hēt 'trɛd-ə-bəl 'al, ɔi }

**heat-treating film** [MET] An oxide coating formed on a metal surface by heat treating. { 'hēt, 'trɛd-ɪŋ, fɪlm }

**heat treatment** [MET] Heating and cooling a metal or alloy to obtain desired properties or conditions. { 'hēt, trɛt-mənt }

**heat value** See heat of combustion. { 'hēt, val-yū }

**heat wave** [ELECTROMAG] Infrared radiation, much higher in frequency than radio waves. [METEOROL] A period of abnormally and uncomfortably hot and usually humid weather; the condition must prevail at least 1 day to be a heat wave, but conventionally the term is reserved for periods of several days to several weeks. Also known as hot wave; warm wave. { 'hēt, wāv }

**heave** [GEOL] 1. The horizontal component of the slip, measured at right angles to the strike of the fault. [MIN ENG] A rising of the floor of a mine caused by its being too soft to resist the weight on the pillars. 2. A predominantly upward movement of the surface of the soil due to expansion or displacement. [OCEANOGR] The motion imparted to a floating body by wave action. { 'hēv }

**heave compensator** [PETRO ENG] A motion compensator on a floating offshore drilling rig that moves with vertical motion to maintain a constant pressure on the drilling bit. { 'hēv kəm-pən, sād-ər }

**heavenly body** See celestial body. { 'hev-ən-lē 'bād-ē }

**heaves** [VET MED] Chronic emphysema in horses marked by labored breathing due to overdistension of the alveoli. Also known as broken wind. { 'hēvz }

**heave to** [NAV] To bring a ship into such a position that there is no headway. { 'hēv 'tū }

**heavier-than-air craft** [AERO ENG] Any aircraft weighing more than the air it displaces. { 'hev-ər 'θæn 'er 'kraɪt }

## heavy-fermion superconductor

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**heaving** [NAV ARCH] Vertical motion of a ship, as distinguished from pitching. [PETRO ENG] Partial or total collapse of drill hole walls resulting from internal pressures mainly due to swelling from hydration or formation gas pressures. { 'hēv-ɪŋ }

**heaving plug** [PETRO ENG] A plug at the bottom of an oil well which stops unconsolidated sand from mixing with the oil. { 'hēv-ɪŋ, pləg }

**Heaviside calculus** [MATH] A type of operational calculus that is used to completely analyze a linear dynamical system which represents some vibrating physical system. { 'hev-ē, sɪd 'kalk-yl-əs }

**Heaviside layer** See E layer. { 'hev-ē, sɪd, lār-ər }

**Heaviside-Lorentz system** [ELECTROMAG] A system of electrical units which is the same as the Gaussian system except that the units of charge and current are smaller by a factor of  $1/\sqrt{4\pi}$ , and those of electric and magnetic field are larger by a factor by  $\sqrt{4\pi}$ . Also known as Lorentz-Heaviside system. { 'hev-ē, sɪd ló'rents, sɪs-təm }

**Heaviside's expansion theorem** [MATH] A theorem providing an infinite series representation for the inverse Laplace transforms of functions of a particular type. { 'hev-ē, sɪd ɪk'spən-shən, θɪr-əm }

**Heaviside unit function** [MATH] The real function  $f(x)$  whose value is 0 if  $x$  is negative and whose value is 1 otherwise. { 'hev-ē, sɪd 'yü-nət 'fəŋk-shən }

**heavy acid** See phosphotungstic acid. { 'hev-ē 'as-əd }

**heavy alloy** [MET] A tungsten-nickel alloy produced by pressing and sintering the metallic powders; used for screens for x-ray tubes and radioactivity units and for contact surfaces of circuit breakers. { 'hev-ē 'al, ɔi }

**heavy antiaircraft artillery** [ORD] Conventional antiaircraft artillery pieces larger than 90-millimeter, the weight of which in a trailed mount is greater than 40,000 pounds (18,000 kilograms). { 'hev-ē, ən-tē'er, kraɪt 'ɑr-tɪl-ə-rē }

**heavy artillery** [ORD] Artillery other than antiaircraft artillery; consists of howitzers and longer-barreled cannon not classified as medium artillery. { 'hev-ē 'ɑr-tɪl-ə-rē }

**heavy bombardment** [ORD] A bombardment of great intensity, especially one with large aerial bombs or other missiles. { 'hev-ē bām'bārd-mənt }

**heavy bomber** [AERO ENG] Any large bomber considered to be relatively heavy, such as a bomber having a gross weight, including bomb load, of 250,000 pounds (113,000 kilograms) or more, as the B-36 and the B-52. { 'hev-ē 'bām-ər }

**heavy chain** [IMMUNOL] The heavier of the two types of polypeptide chains occurring in immunoglobulin molecules, its molecular weight range being 50,000–70,000. Also known as A chain; H chain. { 'hev-ē 'čān }

**heavy concrete** [MATER] Concrete in which some or all rock aggregate is replaced by metal aggregate. { 'hev-ē kən'krɛt }

**heavy crude** [PETRO ENG] Crude oil having a high proportion of viscous, high-molecular-weight hydrocarbons, and often having a high sulfur content. { 'hev-ē 'krüd }

**heavy cruiser** [NAV ARCH] A warship designed to operate with strike, antisubmarine-warfare, or amphibious forces against air and surface threats. { 'hev-ē 'krüz-ər }

**heavy drop** [ORD] An airdrop in which heavy articles, such as trucks or artillery pieces, are dropped by parachute. { 'hev-ē 'drɒp }

**heavy-duty** [ENG] Designed to withstand excessive strain. { 'hev-ē 'dūd-ē }

**heavy-duty car** [MECH ENG] A railway motorcar weighing more than 1400 pounds (635 kilograms), propelled by an engine of 12–30 horsepower (8900–22,400 watts), and designed for hauling heavy equipment and for hump-yard service. { 'hev-ē 'dūd-ē 'kār }

**heavy-duty oil** [MATER] Lubricating oil with good oxidation stability and corrosion-preventive and detergent-dispersant characteristics; used in high-speed diesel and gasoline engines under heavy-duty service conditions. { 'hev-ē 'dūd-ē 'ɔil }

**heavy-duty tool block** See open-side tool block. { 'hev-ē 'dūd-ē 'tūl, blɒk }

**heavy ends** [MATER] The highest boiling portion of a petroleum fraction. { 'hev-ē 'enz }

**heavy-fermion superconductor** [SOLID STATE] A superconductor in which the superconducting electrons have unusually large effective masses, more than 100 times the mass of a free electron. { 'hev-ē 'fər-mē, ən 'sü-pər-kən, dək-tər }